



## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Mark Rom  
Appl. No. : 09/804,835  
Filed : March 13, 2001  
For : DETERMINING FORM IDENTIFICATION THROUGH  
THE SPATIAL RELATIONSHIP OF INPUT DATA  
Examiner : Phuoc Tran  
Group Art Unit : 2621

DECLARATION UNDER 37 C.F.R. § 131 TO OVERCOME ZLOTNICK

1. This Declaration is to establish the status of the invention in the above-captioned U.S. patent application in the United States on April 19, 2000, which is the effective date of the U.S. Patent No. 6,778,703, entitled FORM RECOGNITION USING REFERENCE AREAS, to Zlotnick, which was cited by the Examiner against the above-captioned application.

2. I, Jacob Joel Faul, am a representative of the 37 CFR § 1.47 applicant.

3. I have read the Office Action mailed September 15, 2004 regarding the above-referenced patent application.

4. Mark Rom is the named sole inventor of the described subject matter and all the claims in this application, including Claims 1-20.

5. I believe Mark Rom developed the invention as described and claimed in the subject application in this country, as evidenced by the following events:

a. By at least April 19, 2000, Mark Rom conceived of a software program for determining identification of forms through the spatial relationship of input data.

b. A copy of a draft patent application prepared by at least April 19, 2000, by Knobbe Martens Olson and Bear LLP (KMOB) is attached as Exhibit A. The automated form identification method comprises storing electronic forms data in a digital signal receiving device as shown at least at page 3 and Figure 3 of Exhibit A. The method further comprises receiving the electronic forms data from the digital signal receiving device at a forms processing computer as shown at least at pages 3-4 and Figure 3 of Exhibit A. The method further comprises storing a plurality of form templates on the forms processing computer, each form template having a plurality of entry fields and a layout, the layout identifying a form location for each of the entry fields as shown at least at

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pages 4-5 and Figures 1, 3 and 4 of Exhibit A. The method further comprises identifying a matching form template for the received electronic forms data based on the entry field locations as shown at least at pages 3-5 and Figures 1-3 of Exhibit A.

c. The automated form identification system comprises a digital signal-receiving device for storing electronic forms data as shown at least at page 3 and Figure 3 of Exhibit A. The system further comprises a forms processing computer capable of receiving the electronic forms data from the digital signal-receiving device as shown at least at pages 3-4 and Figure 3 of Exhibit A. The system further comprises a plurality of form templates stored on the forms processing computer, each form template having a plurality of entry fields and a graphic layout as shown at least at pages 4-5 and Figures 1, 3 and 4 of Exhibit A. The system further comprises a form identification processor for identifying the best matching form template for the received electronic forms data as shown at least at pages 3-5 and Figures 1-3 of Exhibit A.

6. I believe that Mike Cantor, the assignee's in-house patent counsel, diligently worked to finalize and file the draft patent application prepared by KMOB.

7. Therefore, **Exhibit A** shows the features of an automated form identification method and system, which were clearly conceived prior to April 19, 2000 and diligently reduced to practice by at least the filing date of U.S. provisional Patent Application No. 60/242,369.

8. Mark Rom is listed as sole inventor for U.S. Patent Application No. 60/242,369, filed October 21, 2000, which is the priority application for the subject application.

9. Mark Rom is the listed inventor for the subject non-provisional patent application filed on March 13, 2001.

10. All acts leading to the reduction of practice were performed in the United States.

11. This declaration is submitted prior to a final rejection.

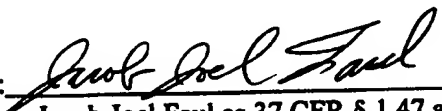
**Penalty of Perjury Statement**

I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful, false statements and the like so made are punishable by

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fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful, false statements may jeopardize the validity of the application or any patent resulting therefrom.

Dated: 1-18-2005

By:   
Jacob Joel Faul as 37 CFR § 1.47 applicant

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## **AUTOMATIC FORM IDENTIFICATION IN PAPERLESS ELECTRONIC FORMS PROCESSING**

### **Problem Being Solved**

Automatic forms processing systems utilize computer hardware and software to scan the forms, identify the form being processed and extract correct information from the form. Form identification is an essential step in the processing of forms. It represents the ability of the system to automatically select the correct form template for the currently processed form. Existing forms processing systems utilize graphic information present on the scanned document to identify the form. Such information may include lines and graphics, blocks of text on the form template, special symbols and form identification numbers.

In paperless forms processing, an electronic device is used to enter the information requested on the form. Only the graphic data entered by the user such as name, address and marked choices is electronically transferred to the forms processing system. Thus, none of the graphic features specific to the design of the processed form are available for form identification. A process described below is utilized to identify the form template, in one embodiment, by relying exclusively on the locations of fields filled in by the user.

### **Summary**

In one aspect of the present invention, there is an automated form identification method, comprising storing electronic forms data in a mobile device, receiving the electronic forms data from the mobile device at a forms processing computer, storing a plurality of form templates on the forms processing computer, each form template having a plurality of entry fields and a layout, the layout identifying a form location for each of the entry fields, and identifying a matching form template for the received electronic forms data based on the entry field locations. One of the form templates may have a first field category and a second field category. The method may additionally comprise scoring each of the fields of the form template depending on the field category and whether data is entered for the field. The scoring may include accumulating field scores in a template score, where the form template with the highest score may be declared to be the matching template for the received

electronic forms data. The first field category may be indicative of a must fill field and the second field category may be indicative of an optional field.

In another aspect of the present invention, there is an automated form identification system, comprising a mobile device capable of storing electronic forms data, a forms processing computer capable of receiving the electronic forms data from the mobile device, a plurality of form templates stored on the forms processing computer, each form template having a plurality of fields and a unique graphic layout, and a form identification process operating on the forms processing computer, the form identification process identifying the best matching form template for the received electronic forms data without use of graphic elements. One of the form templates may have a first field category and a second field category. Each of the fields of the form template may be scored depending on whether data is entered for the field, where the field scores may be accumulated in a template score. The form template with the highest score may be declared to be the best matching template for the received electronic forms data. The first field category is indicative of a must fill field and the second field category is indicative of an optional field.

In another aspect of the present invention, there is an automated form identification method, comprising receiving electronic forms data from a forms device at a forms processing computer, storing a plurality of form templates on the forms processing computer, each form template having a plurality of entry fields and a layout, the layout identifying a form location for each of the entry fields, and identifying a matching form template for the received electronic forms data based on the entry field locations. The forms device may comprise a portable digital notepad or a dropout scanner.

In another aspect of the present invention, there is an automated form identification method, comprising receiving electronic forms data at a dropout scanner, transferring the electronic forms data from the dropout scanner to a forms processing computer, storing a plurality of form templates on the forms processing computer, each form template having a plurality of entry fields and a layout, the layout identifying a form location for each of the entry fields, and identifying a matching form template for the electronic forms data based on the entry field locations.

## **Description of the Invention**

Processing of scanned or faxed forms is depicted in Figure 1. Bitmap images of scanned forms and faxed forms undergo cleaning and preprocessing prior to being submitted to a form identification process. The form identification process utilizes a graphic layout of the form template. The bitmap images of processed forms are searched for similar graphic features: blocks of text, lines and/or form identification numbers. These steps may be performed by a forms processing computer. The creation and interpretation of forms is described in U.S. Patent No. 5,555,101, which is hereby incorporated by reference.

Figure 2 depicts a processing scheme of electronically filled forms and Figure 3 shows one embodiment of a forms processing system. Various different input devices may be utilized by the system. In one embodiment, an electronic input device equipped with a special pen capable of digitally recording graphic information is used to fill out forms. This input device (e.g., CrossPad, available from A.T. Cross Company) can be carried around separately from the forms processing computer and is able to electronically store a significant amount of filled-out or completed forms. Unprocessed forms are loaded into the forms processing system at a later time.

The exemplary CrossPad input device is a portable digital notepad that stores and organizes writing in ink on a standard pad and allows the handwriting to be uploaded to a personal computer (PC). The notepad device uses a digital pen equipped with a small radio frequency (RF) transmitter to allow users to complete forms on a standard size notepad tablet, e.g., 8.5 inch x 11 inch or 6 inch x 9 inch, affixed to the digital notepad. An exemplary (unfilled) form that may be one sheet of the notepad tablet is shown in Figure 4. The RF transmitter sends pen stroke data to the notepad device automatically when the pen makes contact with the form. Signals from the digital pen are stored as digital data (a time series of points) in the memory of the notepad device. Selected handwriting may be converted to a bit-map for exporting from the device. In one embodiment, the notepad device may include one MB of flash read-only memory (ROM) which may store up to 50-80 pages of data, depending on the size of the notepad tablet. The personal computer to which the notepad device uploads the

data uses a Pentium or better processor, and operates using the Windows 95, 98, or NT 4.0 operating software.

In another embodiment, the input device may be what is known as a dropout scanner, such as a model 8125DS scanner available from Bell & Howell. The scanner includes a light bulb of a specific color, e.g., red or green. Forms may be printed using a light ink which matches the color of the light bulb. In one embodiment, the entire form is printed using the matching light ink color, which allows for one color dropout forms. When such a form is completed by a user and then is scanned by the scanner, the scanner does not detect the specific ink color of the form. However, the data entered by the user on the form is detected and is captured.

The forms processing system receives bitmap images consisting of the data entered through the electronic input device. This data does not explicitly specify the form template. This data also does not include any of the graphic data utilized for form identification with scanned or faxed forms, that is, electronically-filled form images have no form identification numbers, lines, preprinted text or other graphic elements from the form template. In one embodiment, image data received by the forms processing system may consist exclusively of the personal information handwritten or hand-typed by the applicant. This information is entered into appropriate fields on the form as specified in the form template. The form identification process utilizes the location of these entry fields in the form template, compares them with the locations of written text in the currently processed form, and selects the best fitting form template. This process is further described in conjunction with Figure 5 below. Once the form has been identified, interpretation of the fields specific to a particular form and further processing of the data can resume.

Figure 5 shows a flowchart for the form identification process. **Joel to provide flowchart and description.**

Different fields on a form template fall into one of the two categories: MUST FILL and OPTIONAL. The MUST FILL fields may be represented by the name of the applicant, address, social security number and so forth. Choice fields, additional names, addresses and numbers are examples of OPTIONAL fields. On a filled out form, either type of field may be filled or missing (not filled). Referring to Table 1, the following scheme of weights is adopted to count filled and missing fields, and to compute the total score for each form template in the currently processed set.

**Table 1**

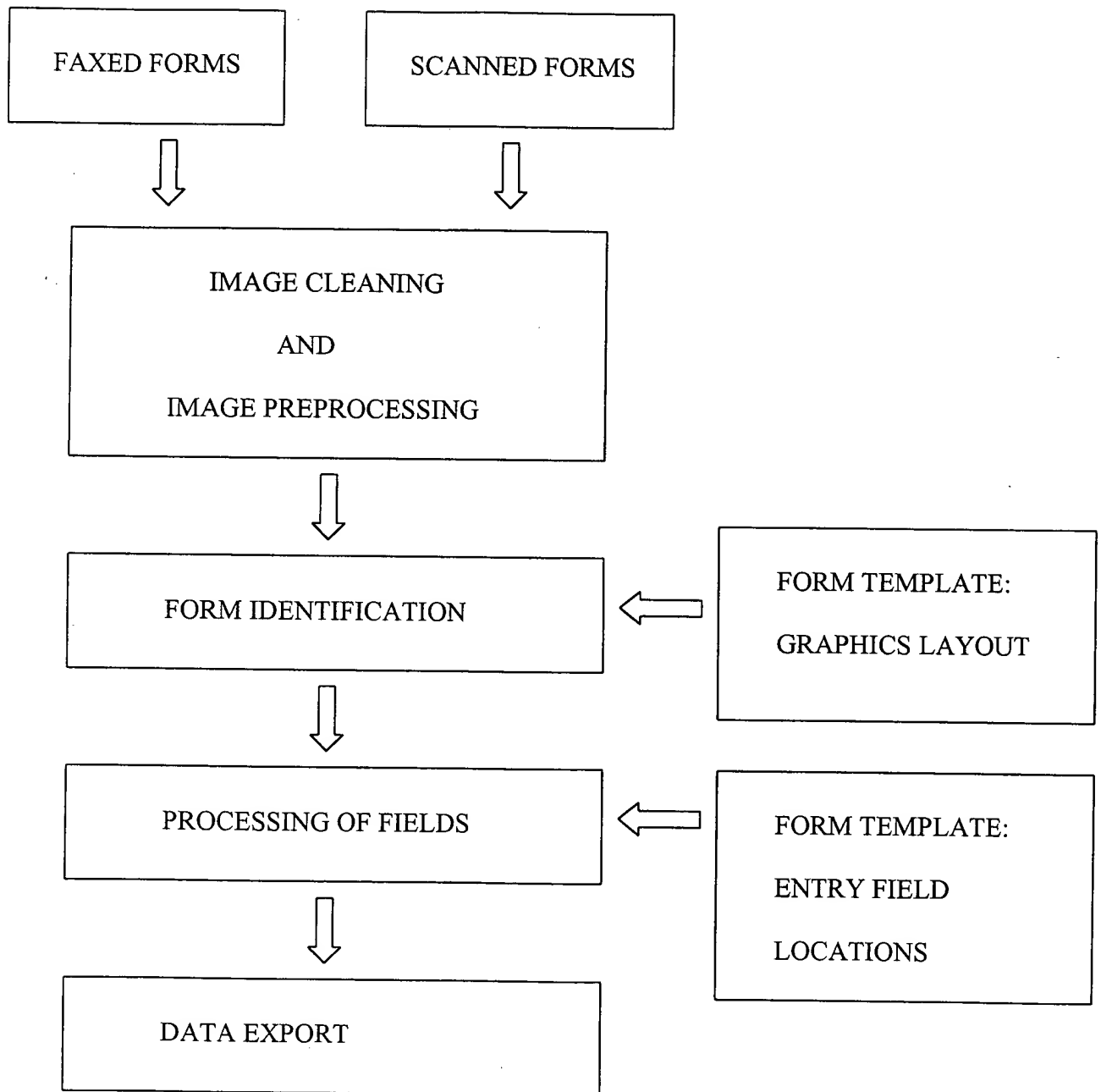
| <u>Field type</u> | <u>Field is filled</u> | <u>Field is missing</u> |
|-------------------|------------------------|-------------------------|
| MUST FILL         | 1.0                    | - 0.5                   |
| OPTIONAL          | 0.5                    | 0.0                     |

For MUST FILL fields, the presence of text at the expected location yields a weight of 1, while a missing MUST FILL field contributes a negative number. OPTIONAL fields contribute 0 when missed and a number between 0 and 1 when filled. The total score for a form is the sum of weights for all fields in the template. The template with the highest score yields the correct form.

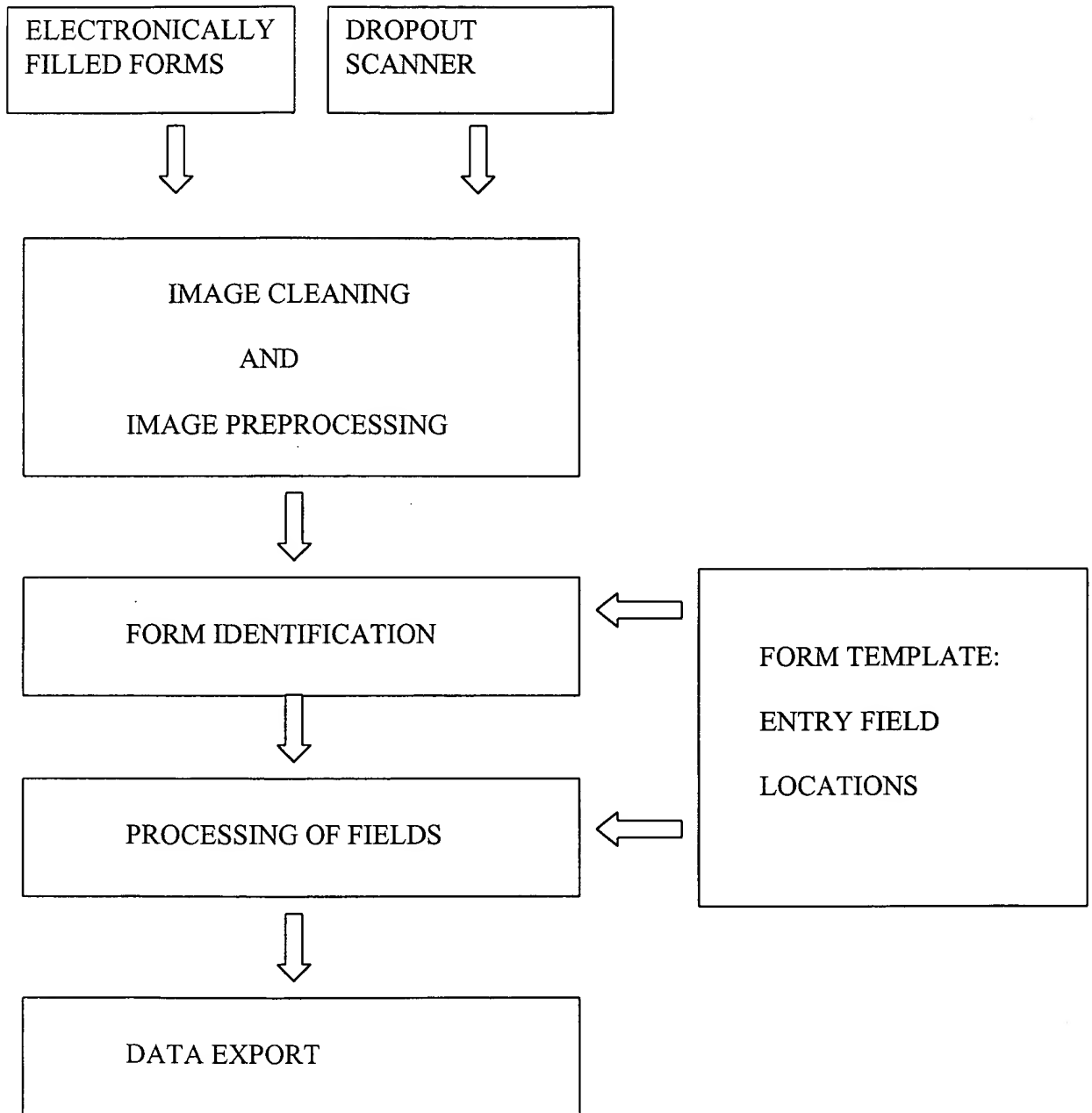
### **Features and Advantages**

Automatic Form Identification in Paperless Electronic Forms Processing facilitates better utilization of electronic input devices such as IBM's CrossPad. Such devices provide temporary storage for the entered data, which can be downloaded into the computer at a later time. Processing of the data is carried out independently of the data collection. When applied to automatic forms processing, the versatility of CrossPad-like devices allows it to be used in the field and under conditions prohibiting the use of a computer station. The ability to identify the correct form template exclusively from the user-entered graphic data represents a new functional element and is fundamental in the forms processing scheme explained herein.





**FIG. 1**



**FIG. 2**

# FORMS PROCESSING SYSTEM

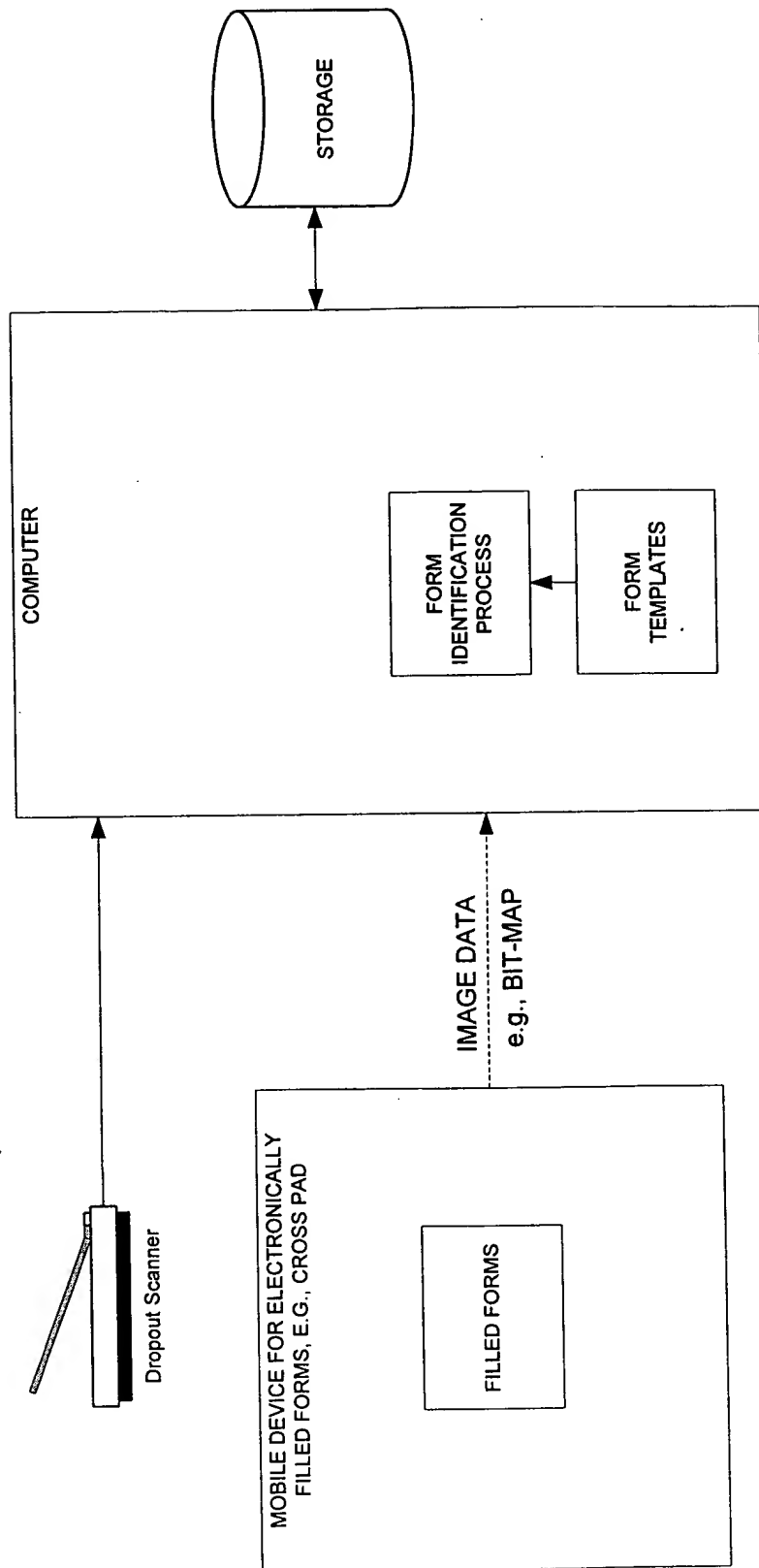
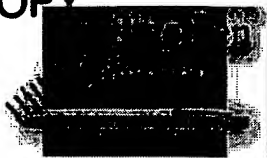


FIG. 3

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# Order Form

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|   |  |                                      |
|---|--|--------------------------------------|
| Tony Anderson<br>141 Orange Avenue<br>Pasadena CA 92111 |  | Customer No. <input type="text"/>    |
|   |  | Company Name ** <input type="text"/> |

## Ship to address if different:


Name

Address

City  State  Zip Code

## Product Selection:

| Item Number          | Page                 | Item Description     | Qty                  | Unit Price           | Total Price          |
|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |

  
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Credit Card Number

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FIG. 4



Flowchart  
of the  
Forms Identification Process

FIG. 5